	Application No.	Applicant(s)
Notice of Allowability	09/541,444	COTA-ROBLES ET AL.
	Examiner	Art Unit	
	GEORGE L. OPIE	2194	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--
All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the RCE and the IDS filed 9/12/05* .

2. ☒ The allowed claim(s) is/are *1-3, 8-15, 17-19, 21-27, and 29 (now renumbered as 1-22)*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some*   c) ☐ None of the:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____ .

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of
    Paper No./Mail Date _____ .

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _12/9/2005_

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application

6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____ .

WILLIAM THOMSON
SUPERVISORY PATENT EXAMINER

Examiner's Amendment

An examiner's Amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 C.F.R 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the Issue Fee.

Any comments considered necessary by applicant must be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferably **accompany** the Issue Fee.

In a Telephone call on 8 September 2006, authorization for this Amendment was given by Mr. William W. Schaal (Reg. No. 39,018).

The claims have been amended as specified by Applicant in the e-mail Amendment dated 16 August 2005, which is attached hereto.

Claim 19 has been further amended hereby as follows: on line 10, replace "said plurality of virtual machines" with "a plurality of virtual machines", and on line 11, replace "a plurality of virtual machines" with "said plurality of virtual machines".

Reasons for Allowance

The documents in Applicant's Information Disclosure Statement IDS) that was submitted on 9 December 2005, have been considered, and the pending claims allowability has been unaffected by the information.

Contact Information:

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system.

Status information for published applications may be obtained from either Private-PAIR or Public-PAIR.

Status information for unpublished applications is available through Private-PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov.

Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

The Official fax number (571) 273-8300 should be used for any and all facsimile submissions to the Office.

Hand carried responses should be delivered to the *Customer Service Window* (Randolph Building, 401 Dulany Street, Alexandria, Virginia 22314) and, if submitting an electronic copy on floppy or CD, to expedite its processing, please notify the below identified examiner prior to delivery, so that the Applicant can "handoff" the electronic copy directly to the examiner.

All responses sent by U.S. Mail should be mailed to:
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist at **(571) 272-2100.**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Opie at 571-272-3766 or via e-mail at *George.Opie@uspto.gov.* Internet e-mail should not be used where sensitive data will be exchanged or where there exists a possibility that sensitive data could be identified unless there is an express waiver of the confidentiality requirements under 35 U.S.C. 122 by the Applicant. Sensitive data includes confidential information related to patent applications.
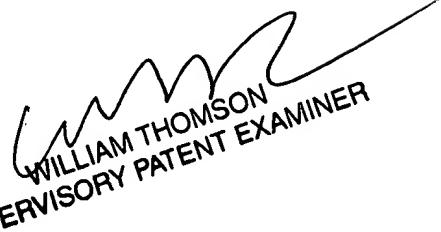
WILLIAM THOMSON
SUPERVISORY PATENT EXAMINER

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application. No. : 09/541,444   Confirmation No. 3693
Applicant   : Erik C. Cota-Robles
Filed   : 03/31/2000
TC/A.U.   : 2126
Examiner   : George L. Opie

Docket No.   : 042390.P7920
Customer No.   : 8791

Commissioner for Patents
PO Box 1450
Alexandria VA 22313-1450

SUPPLEMENTAL AMENDMENT

Sir:

In further response to the Office Action of February 9, 2005, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 10 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.   (Currently Amended) A <u>computerized</u> method for scheduling a plurality of virtual machines comprising:

determining a respective resource requirement for each virtual machine<u> comprises communicating said resource requirement from an application running within an operating system running within a respective virtual machine, said application is a resource management application, which dynamically maintains said respective resource requirement</u>;

determining a respective interrupt period for each virtual machine based on estimating the respective interrupt period for periodic interrupts and converging the respective interrupt period to be substantially equal to actual periods for the periodic interrupts; and

scheduling said plurality of virtual machines based, at least in part, on said respective resource requirement and interrupt period values.

2.   (Previously Presented) The method of claim 1 wherein, determining said respective resource requirement and interrupt period comprises communicating said respective resource requirement and interrupt period from an operating system running within said respective virtual machine.

3.   (Currently Amended) The method of claim 1 wherein, determining said resource requirement and said interrupt period comprises communicating said resource requirement and said interrupt period from <u>said</u> [[an]] application running within <u>said</u> [[an]] operating system running within said respective virtual machine.

4.   (Cancelled).

5.   (Cancelled).

6.   (Cancelled).

7.   (Cancelled).

8.   (Currently Amended) A [[The]] <u>computerized</u> method <s>of claim 1, wherein</s> <u>for</u> <u>scheduling a plurality of virtual machines comprising:</u>

determining a respective resource requirement <u>for each virtual machine</u> comprises:

monitoring whether a virtual machine reaches an idle loop<u>,</u>[[;]]

increasing said respective resource requirement if said idle loop is not reached<u>,</u>[[;]] <u>and</u>

decreasing said respective resource requirement if said idle loop is reached before a predetermined percentage of said resource requirement has been utilized<u>;</u>

<u>determining a respective interrupt period for each virtual machine based on estimating the</u> <u>respective interrupt period for periodic interrupts and converging the respective interrupt period</u> <u>to be substantially equal to actual periods for the periodic interrupts; and</u>

<u>scheduling said plurality of virtual machines based, at least in part, on said respective</u> <u>resource requirement and interrupt period values.</u>

9.   (Currently Amended) A <u>computerized</u> method for scheduling a plurality of virtual machines comprising:

determining a respective resource requirement for each virtual machine;

determining a respective interrupt period for each virtual machine, said determining respective interrupt period values comprises:

filtering non-periodic interrupts,

rejecting aperiodic interrupts,

estimating said respective interrupt period values for periodic interrupts, and

converging said respective interrupt period values to be substantially equivalent to actual periods for said periodic interrupts; and

scheduling said plurality of virtual machines based, at least in part, on said respective resource requirement and interrupt period values.

10.   (Currently Amended) An article comprising: a storage medium having stored thereon instructions that, when executed, result in a computing platform having the capability to:

acquire resource requirements for a plurality of virtual machines from the plurality of virtual machines;

determine a respective resource requirement by detecting an occurrence of an idle loop within a virtual machine of said plurality of virtual machines and adjusting a resource requirement based, at least in part, on whether said idle loop occurs; and

schedule said plurality of virtual machines implemented in said computing platform based, at least in part, on said [[a]] respective resource requirement and a respective interrupt period for each of said plurality of virtual machines.

11.   (Previously Presented) The article of claim 10, wherein said instructions, when executed result in the capability to acquire said respective resource requirements from applications running within said plurality of virtual machines.

12.   (Previously Presented) The article of claim 11, wherein said instructions, when executed result in the capability to acquire said respective interrupt periods from applications running within said plurality of virtual machines.

13.   (Previously Presented) The article of claim 10, wherein said instructions, when executed result in the capability to acquire said respective resource requirements and said respective interrupt periods from operating systems running within said plurality of virtual machines.

14.   (Previously Presented) The article of claim 10, wherein said instructions, when executed result in the capability to acquire said respective resource requirements and said respective interrupt periods from a resource management applications running within said plurality of virtual machines.

15.   (Previously Presented) The article of claim 10, wherein said instructions, when executed result in the capability to determine said respective interrupt period by comparing an expected interrupt period with an actual interrupt period and adjusting said respective interrupt period based, at least in part, on said comparison.

16.   (Cancelled).

17.   (Currently Amended) A <u>computerized</u> method for determining interrupt period values comprising:

initializing said interrupt period values for a plurality of virtual machines;

adjusting said interrupt period values of said plurality of virtual machines iteratively until substantially equivalent to actual interrupt periods; and

acquiring resource requirement values for said plurality of virtual machines from said plurality of virtual machines, <u>including</u>

<u>initializing said resource requirement values, and</u>

<u>adjusting said resource requirement values iteratively based, at least in part, on a</u> <u>determination of whether each virtual machine of the plurality of virtual machines</u> <u>executed a respective predetermined instruction.</u>

18.   (Previously Presented) The method of claim 17, further comprising:

scheduling said plurality of virtual machines to achieve real-time deadlines based, at least in part, on said interrupt period values and resource requirement values.

19.   (Currently Amended) A <u>computerized</u> method for determining interrupt period values comprising:

initializing said interrupt period values;

generating virtualized interrupts by virtualizing hardware interrupts;

filtering known non-periodic interrupts;

rejecting detected aperiodic interrupts;

adjusting said interrupt period values iteratively until substantially equivalent to actual interrupt periods;

acquiring resource requirement values, said resource requirement values are acquired from said plurality of virtual machines; and

scheduling a plurality of virtual machines to achieve real-time deadlines based, at least in part, on said interrupt period values and resource requirement values.

20.   (Cancelled).

21.   (Currently Amended) The method of claim 17[[20]], wherein adjusting said resource requirement values comprises:

increasing said resource requirement values if execution of said respective predetermined instruction does not occur;

decreasing said resource requirement values if execution of said respective predetermined instruction occurs prior to a target time; and

scheduling said plurality of virtual machines based, at least in part, on said interrupt period values and said resource requirement values.

22.   (Previously Presented) An article comprising: a storage medium having stored thereon instructions that, when executed, result in a computing system having the capability to:

initialize interrupt period values for a plurality of virtual machines;

adjust said interrupt period values iteratively until substantially equivalent to actual interrupt periods;

increasing resource requirement values if a respective predetermined instruction does not occur;

decreasing said resource requirement values if said respective predetermined instruction occurs prior to a target time; and

scheduling said plurality of virtual machines based, at least in part, on said interrupt period values and said resource requirement values.

23.   (Previously Presented) The article of claim 22, wherein said instructions, when executed, further result in the capability to:

schedule said plurality of virtual machines to achieve real-time deadlines based, at least in part, on said interrupt period values and said resource requirement values.

24.   (Previously Presented) An article comprising: a storage medium having stored thereon instructions that, when executed, result in a computing system having the capability to:

initialize interrupt period values;

generate virtualized interrupts by virtualizing hardware interrupts;

filter known non-periodic interrupts;

reject detected aperiodic interrupts;

adjust said interrupt period values iteratively until substantially equivalent to actual interrupt periods;

acquire resource requirement values, said resource requirement values are acquired from a plurality of virtual machines; and

schedule said plurality of virtual machines to achieve real-time deadlines based, at least in part, on said interrupt period values and said resource requirement values.

25.   (Currently Amended) The article of claim 22, wherein said instructions, when executed, result in said computing system [[platform]] having the further capability to:

initialize said resource requirement values; and

adjust said resource requirement values iteratively based, at least in part, on a determination of an occurrence of said predetermined instruction.

26.   (Previously Presented) The article of claim 25, wherein adjusting said resource requirement values comprises:

increasing said resource requirement values if said respective predetermined instruction does not occur;

decreasing said resource requirement values if said respective predetermined instruction occurs prior to a target time; and

scheduling a plurality of virtual machines based, at least in part, on said interrupt period values and said resource requirement values.

27.   (Currently Amended) A system comprising:

a computing platform;

said computing platform being adapted to implement, at least, a virtual machine monitor and a plurality of virtual machines;

said virtual machine monitor being capable of scheduling said virtual machines to execute real-time applications based, at least in part, on a resource requirement for each virtual machine and an interrupt period for each virtual machine, wherein said virtual machine monitor comprises

a detector capable of determining whether each of said virtual machines issues a predetermined instruction and indicating said determinations to a proportional integral derivative controller;

said proportional integral derivative controller being capable of adjusting said respective resource requirement for said each virtual machine based, at least in part, on said determination and communicating said adjusted respective resource requirement to a [[said]] scheduler; and

an interface capable of communicating respective resource requirement and interrupt period values for said each virtual machine to said virtual machine monitor.

28.   (Cancelled).

29.   (Previously Presented) The system of claim 27, wherein said virtual machine monitor comprises:

a feedback loop capable of determining a respective resource requirement for said each virtual machine;

a hardware interrupt virtualizer capable communicating device interrupts to said plurality of virtual machines and filtering non-periodic interrupts;

an interrupt period detector capable of determining said periods for periodic interrupts and communicating said periods to a scheduler; and

said scheduler being capable of said scheduling of said plurality of virtual machines.

30.   (Cancelled).

REMARKS/ARGUMENTS

This Supplemental Amendment is in response to a telephonic interviews on July 18, 2005 and August 16, 2005. In the Supplemental Amendment, claim 1 has been amended to include limitations of claims 6-7. Moreover, claims 10, 17 and 27 have been revised to include limitations of claims 16, 20 and 28, respectively. Claims 25 and 27 have been amended to correct informalities. In summary, claims 1, 3, 8-10, 17, 19, 21, 25 and 27 have been revised and claims 4-7, 16, 20 and 28 have been cancelled without prejudice.

Conclusion

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: 08/16/2005   By_____

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